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CENTER FOR RESEARCH, INC.
UNIVERSITY OF KANSAS
ERTS DETAILED IMAGE INTERPRETATION REPORT

E7.3-11005

CR-133798

CRINC
DIIR No. 2264-8
Date
Prepared 14 Sept. 1973

Subject:

Interpretation of Land Use And Stream Order, Pawnee River Basin, Kansas.

Subject Geographic Coordinates 38° 15' N/ 100° 00' W NASA Test Site No. n.a.

NASA Image Descriptors:

Basin, Cartography, Cropland, Irrigation, Dendritic Drainage, Rangeland, River, Water Resources

Report Summary:

Land use and stream orders were mapped from ERTS-1 imagery covering the Pawnee River Basin. Total Area of the Basin, Irrigated and Dry land crop area and rangeland area were determined. The stream order of the basin was calculated by the Strahler method and provided more detail than is available on the comparable 1:250,000 sheets. This study has demonstrated the feasibility of using ERTS-1 imagery to map stream networks in greater detail than is required for 1:250,000 scale. The utility of ERTS-1 has also been demonstrated for mapping and mensuration of data relating to permanence of ground cover types and the extent of irrigation.

Imagery References

CRINC Image No.	NASA Image ID Block	Subject Image X	Coordinates Y	Cloud Cover	Image Quality
MP 00330	1024-16511 (16 Aug. 73)	na	na	10%	Excellent

(E73-11005) INTERPRETATION OF LAND USE
AND STREAM ORDER, PAWNEE RIVER BASIN,
KANSAS (Kansas Univ. Center for Research,
Inc.) 6 p HC \$3.00 CSCL 08F

N73-31310

G3/13 Unclass
01005

Map References:

U.S.G.S. (1:250,000) sheets NJ14-4, NJ14-5.

Digital Data Used Yes No x

Image
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Method

An MSS-5 image acquired 16 August 1972 was used for the interpretation of agricultural land use and stream order in the Pawnee River Basin. A mosaic of the river basin was prepared by assembling 3.16 x Polaroid enlargements of the ERTS images. The basin was delimited on an overlay of this mosaic. All streams and stream channels detectable on the film transparencies were plotted on the overlay. A second overlay was prepared with three categories of land use; rangeland, dry cropland, and irrigated cropland. Size, shape topographic position, and tone were used to determine the correct assignment of land use type. Results were verified by comparison to field data available for areas in the western part of the basin. The area of each land use type was then measured with a Hewlett-Packard HP 9800 Calculator/Digitizer.

The map of streams was then converted to a stream order map by the method developed by Strahler (1957).

Results

The stream order map shows five orders. A comparative count from the U.S.GS. 1:250,000 scale topographic map produced only four orders. That is, a greater number of minor tributaries were identified and mapped from the ERTS image than had been depicted on the topographic map.

The land use categories were selected to provide water resources related information. That is, data on permanent cover, which affects runoff, and irrigation, which affects ground water, were mapped and tabulated. The measured area of the Pawnee River Basin was 1,524,043 acres. Of this area, 913,308 acres (59.9 percent of the area) were being cropped by dry farming methods. An additional 70,040 acres (4.6 percent) was under irrigated cultivation. The remaining 540,695 acres (35.5 percent) were rangeland.

A striking distributional pattern of these three categories is apparent on the map. This pattern is closely controlled by terrain. Irrigation is concentrated on the flood plain of Pawnee River and on the flat uplands between the major streams and in the undissected western part of the basin. Rangeland is concentrated on the

dissected areas which separate the flat uplands and floodplains. Since the topography of the eastern end of the basin is gently rolling, no areas unsuited to cultivation are present and rangeland is absent.

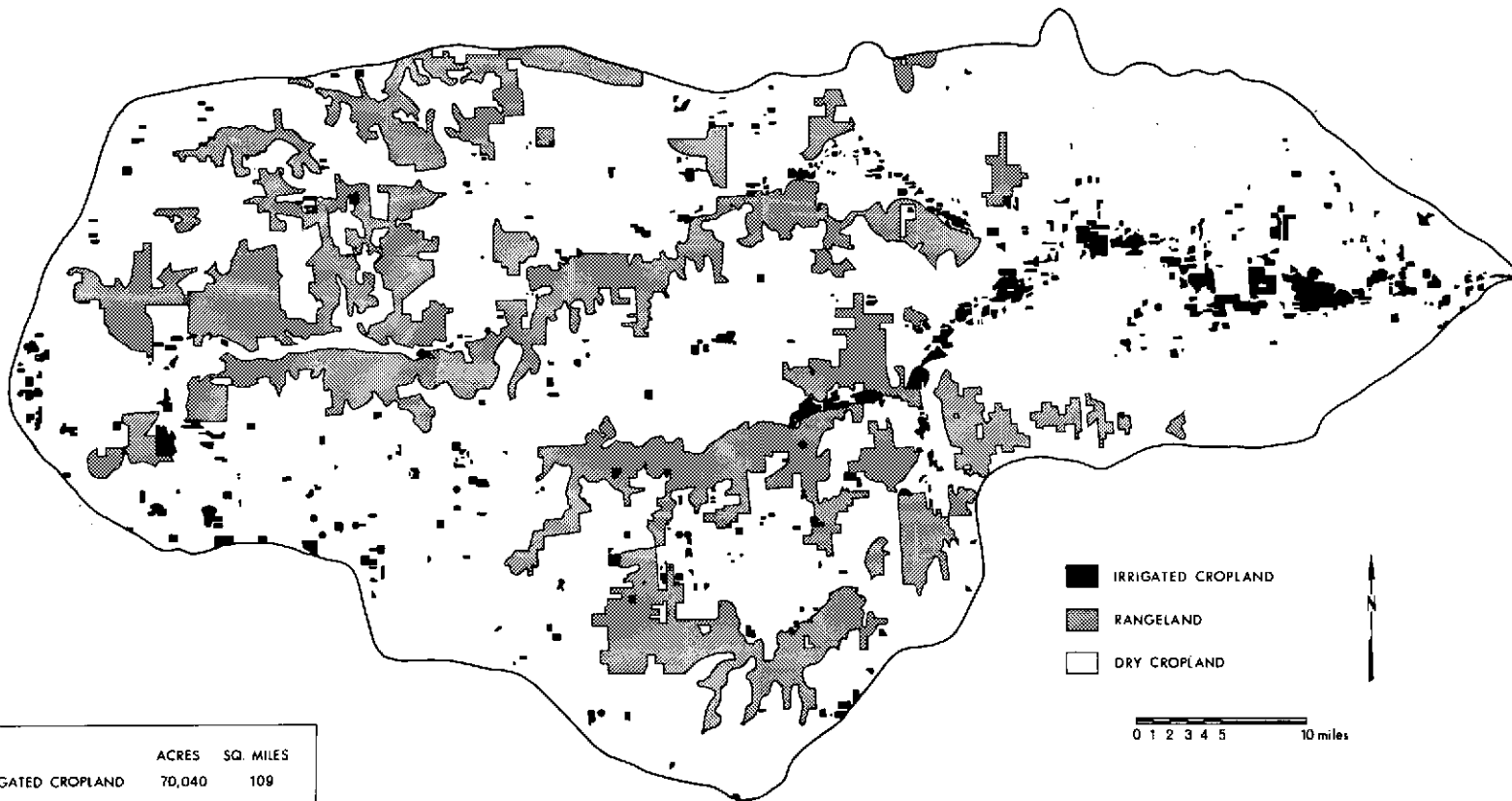
Conclusions

This study has demonstrated the feasibility of using ERTS-1 imagery to map stream networks in greater detail than is required for 1:250,000 scale. The utility of ERTS-1 has also been demonstrated for mapping and mensuration of data relating to permanence of ground cover types and the extent of irrigation.

Reference

Strahler, A. N. (1957), Quantitative Analysis of Watershed Geomorphology. Trans. Amer. Geophys. Union 38:913-920.

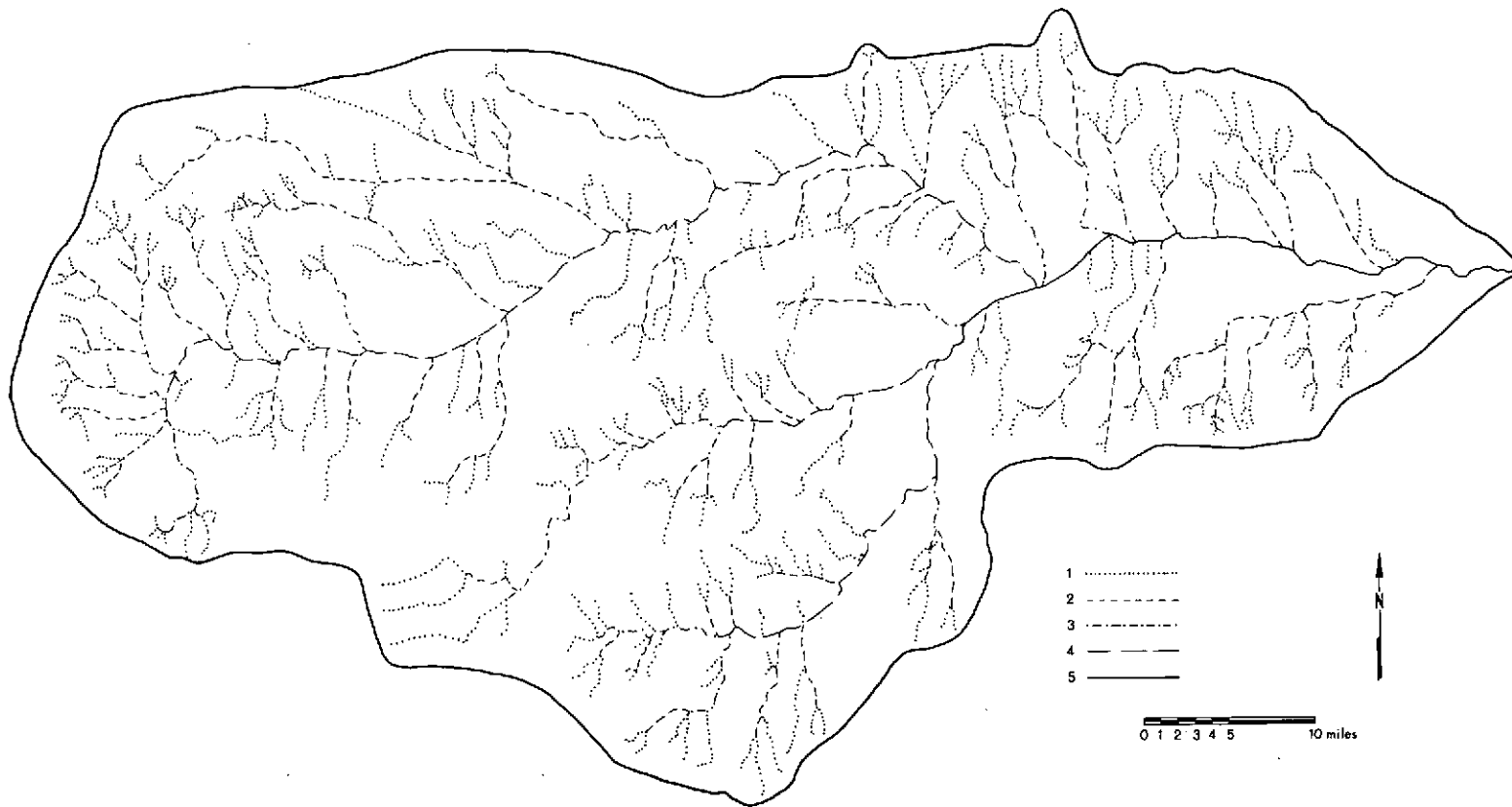
PAWNEE RIVER BASIN, KANSAS LAND USE, AUGUST 16, 1972



	ACRES	SQ. MILES
IRRIGATED CROPLAND	70,040	109
RANGELAND	540,695	845
DRY CROPLAND	913,308	1,427
TOTAL AREA	1,524,043	2,381

SOURCE: NASA ERTS E-1024-38511-5 01
COMPILED BY D.L. WILLIAMS, J.C. COOPER, AND B.L. BARKER

PAWNEE RIVER BASIN, KANSAS
STREAM ORDERS, AUGUST 16, 1972



- 1 (dotted line)
- 2 - - - - - (dashed line)
- 3 - - - - - (long dashed line)
- 4 ——— (solid line)
- 5 ——— (thick solid line)

0 1 2 3 4 5 10 miles



	ACRES	SQ. MILES
TOTAL AREA	1,524,043	2,381

SOURCE: NASA ERTS E-1024-185H-5 Q1
COMPILED BY D.L. WILLIAMS, J.C. COINER, AND D.L. BARKER